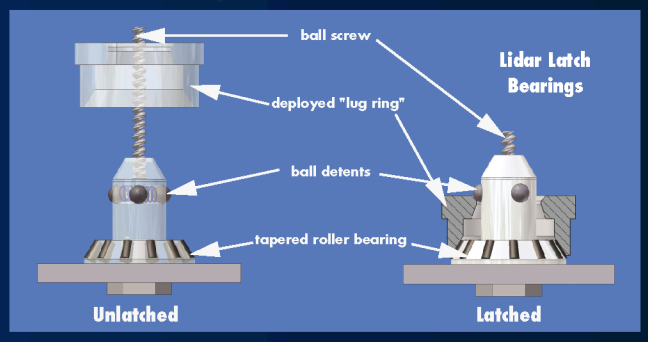
ESTO

Earth Science Technology Office

DEPLOYABLE OPTICS MODELING EXPERIMENTS (DOME) LATCH

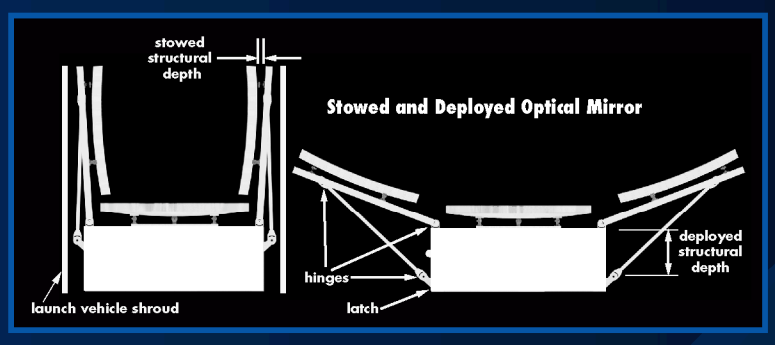
Large Earth observing instruments often need to be deployed – unfolded, unrolled, or otherwise constructed – in space. The design of the DOME Latch ensures that these sensitive systems can be placed in exact, rigid positions to meet precision pointing requirements.

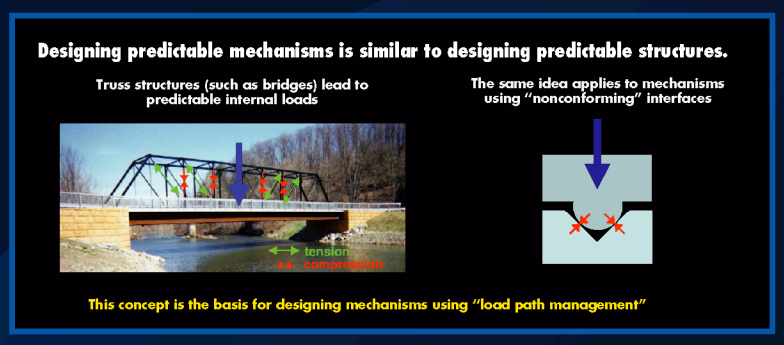


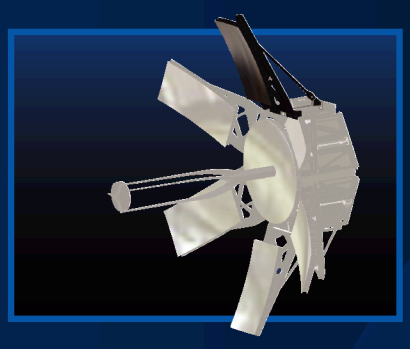
How It Works

Using models such as contact mechanics and microslip friction, the DOME Latch was developed for sub-micron precision and nanometer-level stability. It reduces concern for microdynamics and increases dimensional precision and stability.

The key is a technique called "load path management." This reduces friction-induced slippage and hysteresis within the joints and latches of the DOME mirror segments, allowing for both a cost-effective and precise deployed optic.







Features and Benefits

- Enables deployed optical telescopes with passively controlled figure-precision and stability for LIDAR applications at low cost
- Offers 10 to 50 times increased stability when used with a deployed depth structure
- Reduces microdynamics by controlling the friction-induced hysteresis in the deployed telescope petals
- Allows a Delta II volume instrument to be packaged into a Pegasus container with a 2 to 1 deployed/packaged ratio

Future Applications

- Deployment of mirrors for Earth observing LIDAR telescopes
- Mechanism technology applies equally well to other deployed optical telescopes
- Current concepts work for up to 10 meter deployments in large launch shrouds at 2 to 1 or 3 to 1 deployed/packaged ratios
- Complex deployments of up to 24+ meters from 4-meter diameter launch shrouds are possible with concepts derived from the DOME latch and mechanism technology

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